WHAT IS CLAIMED IS:

1. A maximum likelihood decoding method for obtaining original information by decoding a reproduced signal from a recording medium or a reproduced signal obtained through a transmission medium, the method comprising:

a first-metric generating step for generating a metric of a reproduced signal generated based on a first partial response, the metric being a first metric;

a second-metric generating step for generating a metric of a reproduced signal generated based on a second partial response, the metric being a second metric; and

a maximum likelihood decoding step for realizing maximum likelihood decoding by using the first metric and the second metric.

2. The method according to Claim 1, wherein the first partial response has a predetermined frequency characteristic which can be realized by adjusting a frequency characteristic of a channel for generating a reproduced signal based on a data signal.

3. The method according to Claim 1, wherein the first partial response is generated by equalizing a reproduced signal, which is reproduced by transferring a data signal,

by using a waveform equalizer.

4. The method according to Claim 1, wherein, in the first-metric generating step, the first metric is generated by calculating a metric between a reproduced signal generated by equalizing a reproduced data signal to the first partial response and a reference signal obtained by inputting a data sequence which can serve as a decoded data sequence to the first partial response.

5. The method according to Claim 1, wherein the second partial response is a differential partial response obtained by calculating a difference between the first partial response and a response generated by shifting the first partial response by 1 channel clock.

6. The method according to Claim 1, wherein, in the second-metric generating step, the second metric is generated by calculating a metric between a reproduced signal generated by equalizing a reproduced data signal to the second partial response and a reference signal obtained by inputting a data sequence which can serve as a decoded data sequence to the second partial response.

7. The method according to Claim 1, wherein the metric

is the square of a difference in an amplitude level between a sample of a reproduced signal generated by reproducing a data signal based on a predetermined partial response and a sample of a reference signal generated by using a data signal which can serve as a decoded data signal based on the partial response.

8. The method according to Claim 1, wherein the metric is the absolute value of a difference in an amplitude level between a sample of a reproduced signal generated by reproducing a data signal based on a predetermined partial response and a sample of a reference signal generated by using a data signal which can serve as a decoded data signal based on the partial response.

9. The method according to Claim 1, wherein the metric is the function of a difference in an amplitude level between a sample of a reproduced signal generated by reproducing a data signal based on a predetermined partial response and a sample of a reference signal generated by using a data signal which can serve as a decoded data signal based on the partial response.

10. The method according to Claim 1, wherein the maximum likelihood decoding step comprises:

a metric synthesizing step for synthesizing the first metric and the second metric at a predetermined ratio; and

a Viterbi decoding step for obtaining original data by using the synthetic metric by maximum likelihood decoding.

11. The method according to Claim 10, wherein the ratio of the first metric and the second metric is adjusted in accordance with the frequency characteristic of noise contained in a reproduced signal reproduced by transferring a data signal.

12. The method according to Claim 1, wherein a Viterbi algorithm is used in the maximum likelihood decoding step, and a data pattern representing states which form the Viterbi algorithm includes pieces of data whose number is the same as the number of pieces of data required for generating the first partial response.

13. The method according to Claim 1, wherein a Viterbi algorithm is used in the maximum likelihood decoding step, and a data pattern representing states which form the Viterbi algorithm includes pieces of data whose number is smaller by one than the number of pieces of data required for generating the second partial response.

14. The method according to Claim 1, wherein a Viterbi algorithm is used in the maximum likelihood decoding step, and a data pattern representing states which form the Viterbi algorithm includes pieces of data whose number is the same as the number of pieces of data required for generating the second partial response.

15. The method according to Claim 1, wherein a Viterbi algorithm is used in the maximum likelihood decoding step, the first metric is defined to each state of Viterbi decoding, and the second metric is defined to each branch of Viterbi decoding.

16. The method according to Claim 1, wherein a Viterbi algorithm is used in the maximum likelihood decoding step, and the first metric and the second metric are defined to each branch of Viterbi decoding.

17. The method according to Claim 1, wherein a Viterbi algorithm is used in the maximum likelihood decoding step, the first metric is defined to each branch of Viterbi decoding, and the second metric is defined to each state of Viterbi decoding.

18. The method according to Claim 1, wherein a Viterbi

algorithm is used in the maximum likelihood decoding step, and a survival path to each state has the smallest path metric in paths to each state.

19. The method according to Claim 1, wherein a Viterbi algorithm is used in the maximum likelihood decoding step, and the path metric of a path in each state can be obtained by multiplying a metric to the first predetermined response by a predetermined constant and then adding the result to the path metric of a survival path to each state.

20. The method according to Claim 1, wherein a Viterbi algorithm is used in the maximum likelihood decoding step, and the path metric of a path in each branch can be obtained by multiplying a metric to the second predetermined response by a predetermined constant and then adding the result to the path metric of a survival path to each branch.

21. A maximum likelihood decoder for obtaining original information by decoding a reproduced signal from a recording medium or a reproduced signal obtained through a transmission medium, the decoder comprising:

first-metric generating means for generating a metric of a reproduced signal generated based on a first partial response, the metric being a first metric;

second-metric generating means for generating a metric of a reproduced signal generated based on a second partial response, the metric being a second metric; and

maximum likelihood decoding means for realizing maximum likelihood decoding by using the first metric and the second metric.

22. The maximum likelihood decoder according to Claim 21, wherein the first partial response has a predetermined frequency characteristic which can be realized by adjusting a frequency characteristic of a channel for generating a reproduced signal based on a data signal.

23. The maximum likelihood decoder according to Claim 21, further comprising a waveform equalizer for equalizing a reproduced signal, which is reproduced by transferring a data signal, to the first partial response.

24. The maximum likelihood decoder according to Claim 21, wherein the first-metric generating means generates the first metric by calculating a metric between a reproduced signal generated by equalizing a reproduced data signal to the first partial response and a reference signal obtained by inputting a data sequence which can serve as a decoded data sequence to the first partial response.

25. The maximum likelihood decoder according to Claim 21, wherein the second partial response is a differential partial response obtained by calculating a difference between the first partial response and a response generated by shifting the first partial response by 1 channel clock.

26. The maximum likelihood decoder according to Claim 21, wherein the second-metric generating means generates the second metric by calculating a metric between a reproduced signal generated by equalizing a reproduced data signal to the second partial response and a reference signal obtained by inputting a data sequence which can serve as a decoded data sequence to the second partial response.

27. The maximum likelihood decoder according to Claim 21, wherein the metric is the square of a difference in an amplitude level between a sample of a reproduced signal generated by reproducing a data signal based on a predetermined partial response and a sample of a reference signal generated by using a data signal which can serve as a decoded data signal based on the partial response.

28. The maximum likelihood decoder according to Claim 21, wherein the metric is the absolute value of a difference

in an amplitude level between a sample of a reproduced signal generated by reproducing a data signal based on a predetermined partial response and a sample of a reference signal generated by using a data signal which can serve as a decoded data signal based on the partial response.

29. The maximum likelihood decoder according to Claim 21, wherein the metric is the function of a difference in an amplitude level between a sample of a reproduced signal generated by reproducing a data signal based on a predetermined partial response and a sample of a reference signal generated by using a data signal which can serve as a decoded data signal based on the partial response.

30. The maximum likelihood decoder according to Claim 21, wherein the maximum likelihood decoding means comprises:

metric synthesizing means for synthesizing the first metric and the second metric at a predetermined ratio; and

Viterbi decoding means for obtaining original data by using the synthetic metric by maximum likelihood decoding.

31. The maximum likelihood decoder according to Claim 30, wherein the metric synthesizing means adjusts the ratio of the first metric and the second metric in accordance with the frequency characteristic of noise contained in a

reproduced signal reproduced by transferring a data signal.

32. The maximum likelihood decoder according to Claim 21, wherein a Viterbi algorithm is used in the maximum likelihood decoding means, and a data pattern representing states which form the Viterbi algorithm includes pieces of data whose number is the same as the number of pieces of data required for generating the first partial response.

33. The maximum likelihood decoder according to Claim 21, wherein a Viterbi algorithm is used in the maximum likelihood decoding means, and a data pattern representing states which form the Viterbi algorithm includes pieces of data whose number is smaller by one than the number of pieces of data required for generating the second partial response.

34. The maximum likelihood decoder according to Claim 21, wherein a Viterbi algorithm is used in the maximum likelihood decoding means, and a data pattern representing states which form the Viterbi algorithm includes pieces of data whose number is the same as the number of pieces of data required for generating the second partial response.

35. The maximum likelihood decoder according to Claim

21, wherein a Viterbi algorithm is used in the maximum likelihood decoding means, the first metric is defined to each state of Viterbi decoding, and the second metric is defined to each branch of Viterbi decoding.

36. The maximum likelihood decoder according to Claim 21, wherein a Viterbi algorithm is used in the maximum likelihood decoding means, and the first metric and the second metric are defined to each branch of Viterbi decoding.

37. The maximum likelihood decoder according to Claim 21, wherein a Viterbi algorithm is used in the maximum likelihood decoding means, the first metric is defined to each branch of Viterbi decoding, and the second metric is defined to each state of Viterbi decoding.

38. The maximum likelihood decoder according to Claim 21, wherein a Viterbi algorithm is used in the maximum likelihood decoding means, and a survival path to each state has the smallest path metric in paths to each state.

39. The maximum likelihood decoder according to Claim 21, wherein a Viterbi algorithm is used in the maximum likelihood decoding means, and the path metric of a path in each state can be obtained by multiplying a metric to the

first predetermined response by a predetermined constant and then adding the result to the path metric of a survival path to each state.

40. The maximum likelihood decoder according to Claim 21, wherein a Viterbi algorithm is used in the maximum likelihood decoding means, and the path metric of a path in each branch can be obtained by multiplying a metric to the second predetermined response by a predetermined constant and then adding the result to the path metric of a survival path to each branch.